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**(54) ALLERGEN-REDUCING FIBER**

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an allergen-reducing fiber automatically reducing allergens sticking to the fiber, especially the allergens abundantly present in beddings, derived from the genus *Dermatophagoides* of the family *Pyroglyphidae* and causing allergic diseases at usually used humidity without carrying out an allergen-reducing treatment again and recovering allergen-reducing functions by simple operation.

**SOLUTION:** The allergen-reducing fiber exhibits allergen-reducing effects in an atmosphere at ≤ 50 g/m<sup>3</sup> absolute humidity.

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## CLAIMS

[Claim(s)]

[Claim 1]

Allergen reduction-sized fiber characterized by the ability to demonstrate allergen reduction-sized effectiveness under absolute humidity of or less [ 50g //m ] 3 ambient atmosphere.

[Claim 2]

The fiber which can form the reaction place from which an interaction with allergen can be started by collecting the water molecules in air, and allergen reduction — the allergen reduction-sized fiber according to claim 1 characterized by consisting of a degassed part.

[Claim 3]

The fiber which can form the reaction place from which an interaction with allergen can be started in allergen reduction-sized fiber according to claim 1 or 2 characterized by containing a hygroscopic compound by collecting the water molecules in air.

[Claim 4]

A hygroscopic compound is allergen reduction-sized fiber according to claim 3 characterized by being a polyether.

[Claim 5]

The fiber which can form the reaction place from which an interaction with allergen can be started in allergen reduction-sized fiber according to claim 1 or 2 characterized by being hygroscopic fiber by collecting the water molecules in air.

[Claim 6]

Hygroscopic fiber is allergen reduction-sized fiber according to claim 5 characterized by being cotton.

[Claim 7]

The fiber which can form the reaction place from which an interaction with allergen can be started in allergen reduction-sized fiber according to claim 1, 2, 3, 4, 5, or 6 characterized by a front face being neutrality or alkalinity by collecting the water molecules in air.

[Claim 8]

The fiber which can form the reaction place from which an interaction with allergen can be started in allergen reduction-sized fiber according to claim 1, 2, 3, 4, 5, 6, or 7 characterized by containing the oxide or hydroxide of alkali metal or alkaline earth metal on a front face by collecting the water molecules in air.

[Translation done.]

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

## [Field of the Invention]

This invention can reduction-ize allergen adhering to fiber automatically under the humidity usually used, without performing allergen reduction-ized processing anew, and relates to the allergen reduction-ized fiber which can recover an allergen reduction-ized function by still simpler actuation.

[0002]

## [Description of the Prior Art]

In recent years, many allergies, such as atopic dermatitis, bronchial asthma, and allergic rhinitis, is posing a problem. The main cause is for the allergen (Der1, Der2) of inside nature Acari of a dwelling and many Chile Dari especially in house dust and much allergens, such as cedar pollen allergen (Crj1, Crj2) which mainly ranges in spring, to increase in a life space.

[0003]

Since the dead insect supplied the allergens high matter to a life space further even if it exterminates Chile Dari who becomes the cause, especially Chile Dari's allergen was difficult for solving fundamentally the allergosis from which dust tick allergen becomes a cause. Moreover, it is the glycoprotein of molecular weight abbreviation 40kDa, and Crj2 is the glycoprotein of molecular weight abbreviation 37kDa, and if Crj1 which is cedar pollen allergen adheres to the turica mucosa nasi etc., it will be recognized as a foreign matter outside a living body, and will trigger an inflammatory response.

[0004]

such allergen -- bedding, such as bedding, a bolster, a blanket, a mattress, a bed mat, and a sheet, and covering -- in the car supplies [ such as filter; car sheets, such as furniture made of cloth such as a sofa made of cloth, a chair, and a bed, and a covering; air cleaner of furniture, an air-conditioner, and a cleaner, a car mat, and an infant seat ]; -- it is easy to accumulate between the fiber of textiles, such as sewing etc.-based toy; carpets, a curtain, clothes, and a towel. Since sleep is barred and its health is especially ruined still more remarkably when long duration contact was carried out and an allergy symptom appears in it while sleeping on the bedding which allergen accumulated, for the patient with allergosis, allergen reduction-ization is desired most.

[0005]

In order to prevent mitigation or new sensitization for the symptom of the allergosis, allergen is completely removed from a life space, or it is needed to carry out to denature allergen etc. and to make it inactive.

[0006]

Among these, as an approach of removing allergen, what controlled the eye of the textile of bedding covering in fixed magnitude is indicated by JP.62-213707A from a life space, and the fixed approach of a textile and a cotton pad is controlled to JP.7-32735B, a technique which Acari does not pass in bedding is indicated, and it is actually produced commercially. However, with these bedding, although Acari could not be passed, the magnitude of Dari's cedar, stools,

etc. used as allergen was 1/10 or less magnitude of Acari itself, and since such allergen became scattering and became still finer with the physical impact, invasion of such allergen could not be suppressed and the mitigation effectiveness of sufficient allergen was not acquired. Furthermore, it was not the interior of bedding and was not what demonstrates any effectiveness to the allergen in the dust dust which falls on from the outside of the interior of a room.

[0007]

although the method of making various allergen inactivate is examined on the other hand -- the conventional allergen reduction-ized method -- for example, allergen reduction -- the approach of reduction-izing allergen in a water solution, such as spraying a degassed part by the spray, was almost the case. However, the location polluted by allergen had troubles, such as always having a bad influence on the body, until these approaches were difficult for it not only taking time and effort, but performing uniform processing and it processed further.

[0008]

## [Problem(s) to be Solved by the Invention]

This invention can reduction-ize allergen adhering to fiber automatically under the humidity usually used in view of the above-mentioned present condition, without performing allergen reduction-ized processing anew, and aims at offering the allergen reduction-ized fiber which can recover an allergen reduction-ized function by still simpler actuation.

[0009]

## [Means for Solving the Problem]

This invention is allergen reduction-ized fiber which can demonstrate allergen reduction-ized effectiveness under a three or less absolute-humidity 50 g/m ambient atmosphere.

This invention is explained in full detail below.

[0010]

The allergen reduction-ized fiber of this invention has allergen reduction-ized effectiveness. In this specification, allergen reduction-ized effectiveness means the effectiveness that reactivity with the specific antibody of those allergen is contracted, when allergen, such as allergen especially leopard HIDANI allergen (Derp 1, Der 2 grade), cedar pollen allergen (Crj 1 and Crj 2), a dog, or cat origin allergen (Can f 1 and Fel d 1), contacts allergen reduction-ized fiber and causes denaturation and desorption.

[0011]

For example, the approach of measuring the amount of allergen by the ELISA method, using an ELISA kit (for example, LCO allergy lab company make) as the technique of checking this allergen reduction-ized effectiveness etc. is mentioned. Moreover, although it is not necessarily clear about whether it is supposed that it has sufficient allergen reduction-ized effectiveness with the effectiveness of how much. According to the sanitary guidance on the front face of bedding ("Indoor contamination and allergy" Yoshikawa *et al.*, Inoue Shiori, 1999), for example, in the case of Der 1 which is the sum total of the allergen of the stools origin of Dermatophagoides pteronyssinus and Dermatophagoides farinae Der 1 which had adhered to the bedding front face two times 2000 to 3000 ng/m is made desirable [ that it is mitigable to two or less 1000 ng/m ]. GBD [0012]

The allergen reduction-ized fiber of this invention can demonstrate allergen reduction-ized effectiveness under a three or less absolute-humidity 50 g/m ambient atmosphere. It originates in 50 g/m<sup>3</sup> whose three or less absolute-humidity 50 g/m is the amount of saturated steam near human being a temperature, and absolute humidity cannot become higher than 50 g/m<sup>3</sup> under the usual indoor conditions. Therefore, it can be said that the allergen reduction-ized fiber of this invention is what can demonstrate allergen reduction-ized effectiveness, without making it high humidity intentionally with a spray etc.

[0013]

the fiber which can form the reaction place from which an interaction with allergen can be started by collecting the water molecules in air as allergen reduction-ized fiber which may discover such a property, and allergen reduction -- what consists of a degassed part is suitable. The thing of the reaction place where advance of a natural chemical reaction may take place is said by the reaction place from which an interaction with allergen can be started by collecting

The water molecules in the above-mentioned air being a reaction place for doing a certain chemical interaction, in order that allergen may control antigenic [ of the part (epitope) which demonstrates antigenic ], for example, stabilizing electrochemical transition states, such as an ionized state, and lowering the obstruction energy of the transition state of a chemical reaction. Usually, in order to lower the energy barrier of the transition state which must be exceeded in order to cause a chemical reaction, the water of a liquid condition is needed, but for the allergen reduction-ized fiber of this invention, since such a place can be formed by collecting the moisture in air, it is not necessary to operate pouring water etc.

[0014]

Although not limited especially as fiber which can form the reaction place from which an interaction with allergen can be started by collecting the water molecules in the above-mentioned air, the fiber containing a hygroscopic compound or hygroscopic fiber is suitable.

[0015]

As the above-mentioned hygroscopic compound, polymer acids [ such as polymer salt; polyacrylic acid ], such as polyalcohol; sodium polyacrylate salts [ such as polyether; polyvinyl alcohol ], such as a polyethylene glycol, a polypropylene glycol, and polyoxymethylene, etc. are mentioned, for example. Especially, since it is easy to emit into a system the water molecule caught only not only in hygroscopicity, a polyether is suitable.

[0016]

The minimum of desirable combination of the above-mentioned hygroscopic compound is 0.01% of the weight of allergen reduction-ized fiber, and an upper limit is 300 % of the weight. If allergen reduction-ized effectiveness may not be acquired as it is less than 0.01 % of the weight, and it exceeds 300 % of the weight, the effectiveness of a reduction-ized agent may be suppressed on the contrary. A more desirable minimum is [ the still more desirable upper limit of an upper limit ] 10 % of the weight 30 % of the weight 0.1% of the weight.

[0017]

As the above-mentioned hygroscopic fiber, a chemical fiber with high moisture absorptive powers, such as the others and acetate which are regenerated fibers, such as natural fibers, such as wool, a silk, hemp, and cotton, and cuprammonium rayon, rayon, etc., and nylon, can also be used, for example. Moreover, the shape of surface type and cross-section configuration of a chemical fiber can be changed, the thing and moisture-absorption-and-desorption-

characteristics macromolecule which were made into porosity can be copolymerized, or it can occur, or can be made sheath-core structure, or what performed special processing of what was combined with the fiber front face, and raised moisture absorption and desorption characteristics can be used. Especially, the point that hygroscopicity is high to cotton is desirable.

Moreover, the fiber which can form the reaction place from which an interaction with allergen can be started by collecting the water molecules in the above-mentioned air may consist only of the above-mentioned hygroscopic fiber, and it does not matter even if it consists of what combined the above-mentioned hygroscopic fiber and nonhygroscopic fiber.

[0018]

As for the fiber which can form the reaction place from which an interaction with allergen can be started, it is desirable by collecting the water molecules in the above-mentioned air that a front face is neutrality or alkalinity. Specifically, it is desirable that pH on the front face of fiber is six or more. Allergen reduction-ized effectiveness improves further that pH on the front face of fiber is six or more.

In addition, as a measuring method of pH on the front face of fiber, pure water is dropped at a fiber front face, and after putting for about 15 minutes until a front face fully carries out humidity, the approach of measuring pH using the pH indicator paper etc. is mentioned, for example

[0019]

Moreover, as for the fiber which can form the reaction place from which an interaction with allergen can be started, it is desirable by collecting the water molecules in the above-mentioned air to contain the oxide or hydroxide of alkali metal or alkaline earth metal on a front face. These have the effectiveness which heightens allergen reduction-ized effectiveness.

The oxide of the above-mentioned alkali metal or an alkaline earth metal or a hydroxide means the oxide or the hydroxide of a lithium, sodium, a potassium, a rubidium, a cesium, a francium, a beryllium, magnesium, calcium, strontium, barium, and radium.

[0020]

The minimum with desirable loadings to the fiber of the oxide of the above-mentioned alkali metal or alkaline earth metal or a hydroxide is 0.001 % of the weight, and an upper limit is 30 % of the weight. Its fiber may be hurt, if the effectiveness which heightens allergen reduction-ized effectiveness as it is less than 0.001 % of the weight may not be acquired and it exceeds 30 % of the weight. For a more desirable minimum, an upper limit is [ the upper limit of a still more desirable minimum ] 1 % of the weight 0.1% of the weight 0.01% of the weight.

[0021]

As the above-mentioned allergen reduction-ized component, it inactivates by carrying out, especially if denaturing allergen etc. is the component which can control an antigen-antibody reaction, it will not be limited, for example, the carbonate of hydroxybenzoic acids, such as plant extract [ such as a tannic acid and a catechin ], 2, and 5-dihydroxybenzoic acid, an aromatic series hydroxy compound, and alkali metal, alum, a lauryl benzenesulfonic acid salt, a lauryl sulfate, a polyoxyethylene lauryl ether sulfate salt, phosphate, a zinc sulfate, lead acetate, etc. are suitable for it.

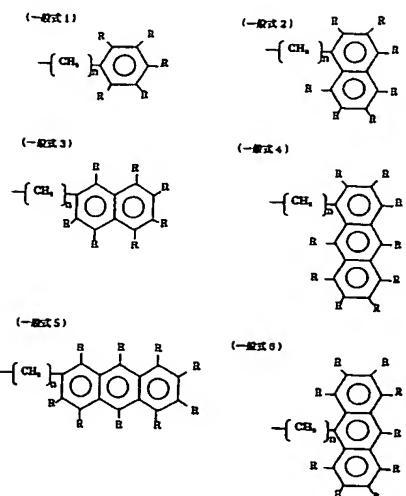
In addition -- the allergen reduction-ized fiber of this invention -- these allergen reduction -- it is [ that at least one of degassing should just be contained as an active principle ] also possible to combine two or more.

[0022]

Although not limited especially as the above-mentioned aromatic series hydroxy compound, the compound which has at least one shown in the side chain of linear macromolecules, such as a vinyl polymerization object, polyester, and a polyamide, at following general formula (1) - (6) from the point that there are few worries about the coloring to fiber etc. is desirable.

[0023]

[Formula 1]



[0024]

R expresses hydrogen or a hydroxyl group among a formula, and at least one is a hydroxyl group. If there is no hydroxyl group, allergen reduction-ized effectiveness may fully be unable to be demonstrated. However, since coloring nature may become strong when there are too many hydroxyl groups, as for a hydroxyl group, it is desirable that it is one. Moreover, as for the location of a hydroxyl group, it is desirable that steric hindrance has combined with fewest parts. for example, it is desirable in a general formula (1) that it is in the para position.

Moreover, n is 0~5. When 5 is exceeded, the effectiveness which uses a linear macromolecule may be lost. Moreover, at least one of the R is a hydroxyl group.

[0025]

The above-mentioned general formula (1) It is not limited especially about the chemical bond of the functional group and linear macromolecule which are shown by (6), for example, carbon-carbon bonding, an ester bond, ether linkage, amide association, etc. are mentioned.

[0026]

Although not limited especially as a compound which has at least one shown in the side chain of the above-mentioned linear macromolecule at above-mentioned general formula (1) ~ (6) From safety or the ease of receiving, for example Pori 3 and 4, 5-hydroxybenzoic-acid vinyl, A polyvinyl phenol, the poly thyrasin, Pori (1-vinyl-5-hydroxy naphthalene), Pori (1-vinyl-6-

hydroxy naphthalene), Pori (1-vinyl-5-hydroxy anthracene), etc. are suitable.

[0027]

Moreover, a polymerization or the thing which it comes to copolymerize is also suitable in the monomer which has the monomer and/or one or more univalent phenolic groups which contain at least one shown in above-mentioned general formula (1) ~ (6) as the above-mentioned aromatic series hydroxy compound.

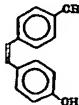
[0028]

1 and 2-JI (4-hydroxyphenyl) ethene which will not be limited especially if it is the compound which one or more monomers which have one hydroxyl group have combined with the benzene ring as a monomer which has the one or more above-mentioned univalent phenolic groups, for example, is shown in a vinyl phenol, a thyrasin, and the following general formula (7) is mentioned. It is effective in being hard to disperse it compared with a polyhydric phenol, if an active principle has a univalent phenolic group.

[0029]

[Formula 2]

(一式7)



[0030]

As other monomers by which copolymerization is carried out to the monomer which has the one or more above-mentioned univalent phenolic groups, ethylene, acrylate, methacrylate, methyl methacrylate, hydroxyethyl methacrylate, hydroxyethyl acrylate, hydroxypropyl acrylate, hydroxypropyl methacrylate, styrene, etc. are mentioned.

[0031]

Moreover, as the above-mentioned aromatic series hydroxy compound, an aromatic heterocycle type hydroxy compound is also suitable.

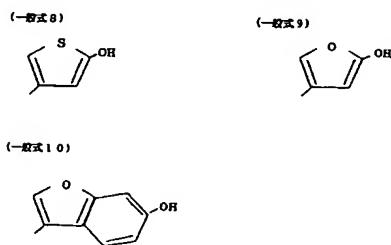
It is not limited especially as the above-mentioned aromatic heterocycle type hydroxy compound, for example, a 2-hydroxy furan, a 2-hydroxy thiophene, hydroxy benzofuran, a 3-hydroxy pyridine, etc. are mentioned. Moreover, you may be a polymerization or the compound which it comes to copolymerize about the monomer which has the compound or aromatic heterocycle type hydroxy group which contains an aromatic heterocycle type hydroxy group in the side chain of a linear macromolecule.

[0032]

As the above-mentioned aromatic heterocycle type hydroxy group, for example The following general formula (8). In a heterocycle frame, What the hydroxy group combined with the frame with the heterocycle shown in the thing; following general formula (10) which the hydroxy group combined with heterocycle frames, such as a thiophene shown in (9), and a furan, and an aromatic series ring; a hydroxy group and a with a carbon number of five or less alkyl group What it has; what has a hydroxy group and a with a carbon number of five or less alkyl group is mentioned to a frame with heterocycle and aromatic series.

[0033]

[Formula 3]



[0034]

As a carbonate of the above-mentioned alkali metal, the carbonate of alkali metal, such as a lithium, sodium, a potassium, a rubidium, caesium, and a francium, is mentioned, for example. Especially, a sodium carbonate and potassium carbonate are desirable.

[0035]

Since the part is specified also as the food additive or the cosmetics raw material as potassium alum, the above-mentioned alum has high safety, and it is used suitable for fiber etc., and it deals in it.

As the above-mentioned alum, the double salt which consists of a sulfate of univalent ion, such as alkali metal, and a thalium, ammonium, is mentioned, for example. [ an aluminum sulfate, and ] Moreover, the double salt which transposed aluminum to chromium, iron, etc. is mentioned similarly. Especially, potassium aluminum sulfate and aluminum sodium sulfate are suitable. Although especially the high potassium aluminum sulfate of allergen reduction-ized capacity is dodecahydrate (AlK(SO<sub>4</sub>)<sub>2</sub>·12H<sub>2</sub>O) or an hydrate (AlK<sub>2</sub>(SO<sub>4</sub>)), it may be a partial hydrate in which a hydrate exists in the process in which a water molecule is lost gradually.

[0036]

As the above-mentioned lauryl benzenesulfonic acid salt, a lauryl sulfate, and a polyoxyethylene lauryl ether sulfonate salt, amine salts, such as metal salts, such as a lithium, sodium, a potassium, and magnesium, ammonium salt, and triethanolamine, are mentioned, for example. Sodium salt and a triethanolamine salt are desirable especially.

[0037]

The above-mentioned phosphate cuts out the salts which generate four to PO<sub>3</sub><sup>4</sup> ion, when it dissolves in a drainage system solvent, for example, a sodium dihydrogenphosphate (phosphoric-acid 1 sodium), disodium hydrogenphosphate (phosphoric-acid disodium), a potassium dihydrogenphosphate, etc. are mentioned.

[0038]

The above-mentioned zinc sulfate is known more as white \*\*\* or a zinc white from ancient times, and adoption is carried out also to the Japanese pharmacopoeia. Moreover, it is a food additive, and since it is added by mother's milk substitutional food for the purpose of growth of people and supply of Zn which is a minute amount metallic element indispensable to health maintenance, safety is high and it is used suitable for fiber etc.

As the above-mentioned zinc sulfate, although a hydrate (seven hydrates) or an hydrate is mainly used, a hydrate may be a partial hydrate which exists in the process in which a water molecule is lost gradually.

[0039]

The above-mentioned lead acetate is known more as sugar of lead from ancient times, and adoption is carried out also to the Japanese pharmacopoeia.

As the above-mentioned lead acetate, although a hydrate (three hydrates) or an anhydride is used, a hydrate may be a partial hydrate which exists in the process in which a water molecule is lost gradually.

[0040]

The minimum of loadings to the allergen reduction-ized fiber of this invention of the above-mentioned allergen reduction-ized component is 0.1 % of the weight, and an upper limit is 300 % of the weight. If allergen reduction-ized effectiveness may not be acquired as it is less than 0.1 % of the weight, and it exceeds 300 % of the weight, a surface layer may become weak firmly, the fall on physical properties may be caused, or omission from fiber etc. may become easy, the effectiveness expected may be unable to be expected, or dirt of the circumference by the omission object is seen and the need for cleaning may come out. For a more desirable minimum, an upper limit is the upper limit of a still more desirable minimum ] 50 % of the weight 0.5% of the weight 100% of the weight 0.2% of the weight.

[0041]

For the allergen reduction-ized fiber of this invention, in the range which does not check the effectiveness of allergen reduction-ized effectiveness, adjuvants for pharmaceutical preparation, such as a wetting agent, an antioxidant, and an ultraviolet ray absorbent, may be blended, and miticide, the gemicide, the antifungal agent, the deodorant, etc. may contain.

[0042]

It limits especially as the manufacture approach of the allergen reduction-ized fiber of this invention -- not having -- the above-mentioned allergen reduction -- a degassed part, a hygroscopic compound, hygroscopic fiber, etc. are chemically combined to fiber, or it is made to back-fix -- an approach is mentioned. In addition this publication does not bar the case where fiber itself is hygroscopic fiber.

concrete -- for example, allergen reduction -- the method of making a fiber front face fix a degassed part and a hygroscopic compound using the approach, solvent, and/or binder which are chemically combined with fiber by the graft-ized reaction etc. is mentioned, in addition -- the case where the above-mentioned graft-ized reaction is adopted -- allergen reduction -- as a degassed part -- the above-mentioned allergen reduction -- the monomer which added reactivity or polymerization nature to a degassed part can be used, and an aromatic series hydroxy compound is suitable especially.

[0043]

The trunk polymer which is not limited especially as the above-mentioned graft-ized reaction, for example, serves as fiber -- a polymerization start point -- building -- allergen reduction -- graft-polymerization method; to which the polymerization of the monomer which forms the branch polymer which is a degassed part etc. is carried out -- the allergen reduction which prepared previously -- the coupling process (the macromolecule reacting method) which combines with a trunk polymer the branch polymer which is a degassed part etc. by the macromolecule reaction is mentioned.

[0044]

It is not limited especially as a describing [ above ] graft polymerization method, for example, the following approaches are mentioned.

- (1) How to use the chain transfer reaction to fiber, and generate and carry out the polymerization of the radical.
- (2) How to make reducibility matter like alcohol, a thiol, and an amine the 2nd cerium salt, a silver sulfate salt, etc. act, to form an oxidation reduction system (redox system), to generate a free radical for fiber, and to perform a polymerization.
- (3) How to oxidize only the approach of irradiating by making fiber and a monomer live together, or fiber using a gamma ray or an acceleration electron ray, to add a monomer behind, and to perform a polymerization.
- (4) How to make this a polymerization start point and carry out [ oxidizes a trunk polymer and

carries out diazo instillation of the peroxy group from the amino group of installation or a side chain, and a polymerization.

(5) How to use polymerization initiation reactions, such as epoxy by the active group of side chains, such as a hydroxyl group, an amino group, and a carboxyl group, a lactam, and a polar vinyl monomer.

[0045] The following concrete for example, approaches are mentioned as a describing [ above ] graft polymerization method. a) How to make a free radical generate and to perform graft polymerization by grinding a cellulose in a vinyl monomer. b) How to perform graft polymerization using celluloses [ for example, mercapto ethyl cellulose etc. ] with a vinyl monomer and the radical which is easy to receive chain transfer on fiber. c) How to perform graft polymerization by the approach of oxidizing ozone and a peroxide and making a radical generating. d) How to introduce double bonds, such as the acyl compound ether, vinyl ether, or methacrylic ester, into the side chain of a cellulose and to perform graft polymerization. e) How to irradiate ultraviolet rays, using Anthracene-2,7-disulfur acid sodium, etc. as a photosensitizer, and to perform graft polymerization. f) How to give an electrochemistry target graft polymerization by winding fiber equipments around the surroundings of a cathode, adding a monomer into a dilute sulfuric acid, and applying foreign voltage. g) How to carry out graft polymerization by heating the fiber which applied glycidyl methacrylate (GMA) and a benzoyl peroxide in a monomer solution. h) How to add a monomer to the liquid which distributed a benzoyl peroxide, the Nonionic-mold surface active agent, and mono-chlorobenzene to water, for it to be immersed, to heat polyester fiber as fiber, and to perform graft polymerization.

If it takes into consideration that it is the graft polymerization to fiber especially, g low or h law is suitable.

[0046] It is not limited especially as the above-mentioned coupling process, for example, the substitution reaction to esterification, etherification, acetalization, ester group, and amide group of the chain transfer reaction and the oxidation reaction to (1) C-H, a substitution reaction, the addition reaction to (2) double bonds, oxidation reaction, and (3) hydroxyl groups, an addition reaction, a hydrolysis reaction, the substitution reaction to a halogen radical, an elimination reaction, the substitution reaction (halogenation, nitration, sulfonation, chloromethylation) to (4) rings, etc. are mentioned.

[0047] The above-mentioned solvent and/or a binder — using — allergen reduction — as the approach of making a degassed part and a hygroscopic compound fixing on the surface of fiber — the above-mentioned allergen reduction — a solvent and/or a binder are made to dissolve or distribute a degassed part etc., and association and/or the approach of making it back-fix are chemically mentioned to fiber after that, moreover — even if it limits and carries out coating especially as association and/or an approach of making it back-fix chemically — reduction — a degassed part — content — a solution — it does not matter even if it applies to fiber with a spray.

[0048] As the above-mentioned solvent — allergen reduction — especially if the thing or binder which can dissolve or distribute a degassed part and a hygroscopic compound can be dissolved, it will limit — not having — for example, water; — amides, such as ketones: N,N-dimethylformamide, ], such as ether; acetones, such as hydrocarbons; diether, such as alcohols; toluene, such as methyl alcohol, ethyl alcohol, and propyl alcohol, a xylene, a methylphthalide, kerosene, and a cyclohexane, a tetrahydrofuran, and dioxane, and a methyl ethyl ketone, are mentioned.

[0049] As a binder which will not be limited as the above-mentioned binder especially if an allergen reduction agent and a hygroscopic compound can be fixed on a fiber front face, for example, consists of synthetic resin, 1 liquid type urethane resin, 2 liquid type urethane resin, acrylic resin, urethane acrylic resin, polyester resin, an unsaturated polyester resin, an alkyd resin, vinyl acetate resin, vinyl chloride resin, an epoxy resin, epoxy acrylate resin, etc. are

mentioned. In the case of a liquid condition, these binders may be used in the condition as it is, or may add the above-mentioned solvent. In the case of a solid state, you may use it in the condition of having dissolved or distributed to the above-mentioned solvent.

These solvents and binders may be used independently and may use two or more sorts together.

[0050] The allergen reduction-ized fiber of this invention — allergen reduction — it is also possible to manufacture by carrying out spinning of the fiber raw material with which it comes to carry out copolymerization of the polymerization nature monomer which has a degassed part and a hygroscopic compound here — the above-mentioned fiber raw material — allergen reduction — copolymerization of the polymerization nature monomer used as the polymerization nature monomer which has a degassed part and a hygroscopic compound, and a common fiber raw material is carried out.

said allergen reduction — as the polymerization nature monomer which has a degassed part and a hygroscopic compound — the above-mentioned allergen reduction — it will not be limited especially if it is the monomer which gave polymerization nature to a degassed part or the hygroscopic compound.

[0051] Moreover, the allergen reduction-ized fiber of this invention — allergen reduction — it is also possible to carry out spinning of a degassed part and the fiber raw material, and to obtain them. The fiber raw material said here — allergen reduction — the fiber raw material and/or the common fiber raw material with which copolymerization of the polymerization nature monomer used as the polymerization nature monomer which has a degassed part and a hygroscopic compound, and a common fiber raw material was carried out are used.

As the above-mentioned general fiber raw material, especially if it is usually used as fiber, being processed, it will not be limited, for example, regenerated-fiber raw materials, such as semi-synthetic fiber raw materials, such as synthetic fiber raw materials [ such as polyolefin fiber, polyurethane, ], such as polyamide fiber, acrylic fibers, such as nylon, a polyvinylidene chloride, a polyvinyl chloride, a polycrylonitrile, polyester, polyethylene, and polypropylene, and acetate, cuprammonium rayon, and rayon, a natural fiber, etc. will be mentioned.

[0052] Furthermore, the above-mentioned allergen reduction — the allergen reduction-ized fiber of this invention can be manufactured also by mixing or \*\*\*ing and carrying out spinning of the fiber raw material containing a degassed part, and the common fiber raw material.

[0053] It is not limited especially as an approach of copolymerizing the polymerization nature monomer used as the above-mentioned allergen reduction-ized component, a hygroscopic compound, and a fiber raw material, for example, condensation reactions, such as hydrogen transfer polymerization, such as addition reactions, such as vinyl polymerization, cyclopolymerization, and ring opening polymerization, a transition polymerization, and isomerization polymerization, an oxidation polymerization, a denitration polymerization, a decarboxylation polymerization, a polycondensation, and addition condensation, etc. are mentioned.

The allergen reduction used for this copolymerization reaction — as a degassed part or a hygroscopic compound — the above-mentioned allergen reduction — although it will not be limited especially if it is the monomer which gave polymerization nature to a degassed part or the hygroscopic compound, an aromatic series hydroxy compound is suitable especially.

[0054] The above-mentioned allergen reduction — especially as an approach of carrying out spinning of a degassed part and the fiber raw material (a common fiber raw material and reduction — a degassed part — content — fiber — a raw material), it is not limited but the following approaches are mentioned.

(1) melt-spinning method; for example, the fiber raw material to fuse, — setting — after heating melting of a fiber raw material, and the decomposition point — the allergen reduction more than the heating melting point of the fiber raw material — the approach of scouring a degassed part

etc., making melting mixed liquor, making extrude and carry out cooling solidification into inactive cooling media (for example, air, nitrogen, water, etc.) through a spinneret with the pore of a restrictor of this, and making it into fiber.

(2) wet spinning method; for example, a fiber raw material, — a solvent — dissolving — a solution — carrying out — allergen reduction — how to solidify the macromolecule which was distribution-mixed, or dissolved a degassed part etc. (spinning undiluted solution), extruded this through the spinneret in the liquid which carries out playback coagulation of the macromolecule, and has melted into the spinning undiluted solution fibrous.

(3) spinning [ dryly ] method; for example, a fiber raw material, — an volatile solvent — dissolving — allergen reduction — the approach of distribution-mixing, or dissolving a degassed part etc., considering as a spinning undiluted solution, extruding this in a heating gas through a mouthpiece, evaporating the solvent in a spinning undiluted solution, and solidifying fibrous. These three approaches are used widely industrially and can be properly used by the allergen reduction-ized fiber made into the purpose.

[0055] Furthermore, allergen reduction other than the above — as the approach of carrying out spinning of a degassed part and the fiber raw material

(4) emulsion spinning method; — the emulsion (suspension, slurry) of a fiber raw material — making — allergen reduction — the approach of being distribution-mixed, or dissolving a degassed part etc., considering as a spinning undiluted solution, and carrying out spinning of this according to a wet spinning method or the spinning [ dryly ] method

(5) conjugate spinning method; — fiber raw material melting of two or more components fused separately — the inside of the body — allergen reduction — a degassed part etc. — distributed mixing — or — dissolving — or allergen reduction — the approach of using the very thing, such as a degassed part, as a melting object, compounding these melting object just before a spinneret, and spinning to coincidence.

(6) approach; for example, allergen reduction, which makes a high polymer fibrous, without using a spinneret — the allergen reduction of the shape of an approach and a rod which cuts thinly, is extended and carries out heat setting to length further after extending the thin film containing a degassed part etc. — the approach of extending the high polymer containing a degassed part etc. to altitude

(7) The approach by the interfacial polymerization

as is mentioned.

[0056] The allergen reduction-ized fiber of this invention can recover an allergen reduction-ized function by various approaches, even if the allergen reduction effectiveness once decreases. When recovery of the above-mentioned allergen reduction-ized function loses the reduction-ized function by contact to repeated allergen, it says enabling it to demonstrate an allergen reduction-ized function again.

The reduction which uses inactivation of allergen — a degassed class — allergen end reduction — a degassed reaction — reduction — the case where a degassed part is consumed, and reduction — a degassed part acts in catalyst and is considered [ that allergen may be inactivated and ]. for this reason, reduction — the reduction which exists in the interior of fiber as an approach of recovering a degassed function, for example — bleed out of a degassed part is carried out to a front face — making — new allergen reduction — the method of making a fiber front face express a degassed part or the method of removing the inactivation allergen which accumulated on the front face of reduction-ized fiber can be considered.

[0057] If an approach is carried out, the approach of washing the allergen reduction-ized fiber of this invention with a liquid of recovering the allergen reduction-ized function of the allergen reduction-ized fiber of this invention, the approach of heating, the approach of drawing in with a cleaner, etc. are specifically mentioned.

Especially if damage is not done to fiber itself as a liquid which can be used for the above-mentioned washing, it will not be limited, for example, amides [ such as ketones N-

dimethylformamide, ], such as ether; acetones, such as hydrocarbons; diether, such as alcohols; toluene, such as water; methyl alcohol, ethyl alcohol, and propyl alcohol, a xylene, a methylphthalide, kerosene, and a cyclohexane, a tetrahydrofuran, and dioxane, and a methyl ethyl ketone, are mentioned. Inside, the point that it can process easily simple also at home to water or alcohols is suitable. Moreover, in order to heighten a cleaning effect, the surfactant generally used may be used together.

[0058] The approach of washing, while heating the approach and the above-mentioned liquid which it will not be limited especially if damage is not done to fiber itself as temperature heated when heating the allergen reduction-ized fiber of above-mentioned this invention, and it is not limited especially as the above-mentioned heating approach, for example, are heated directly, the approach of heating by sunlight, etc. are mentioned.

[0059] Vegetable allergen, such as animal allergen and pollen, is mentioned as target allergen [ fiber / of this invention / allergen reduction-ized ]. The allergen reduction-ized component of this invention reduction-izes allergen of the location which used this agent by suppressing a reaction with the specific antibody of such allergen. As animal allergen with especially effectiveness, it is the allergen (it is the living thing of Acari and Arthropoda-Arachnida-Acarina and mainly divided into seven suborders) of Acari. The back spiracle represented by reed NAGADANI four spiracles represented by KATADANI, the Yamato tick. The posterior spiracle represented by TSUBAMEHIMEDANI, a house dust mite, a spiracle while in mes SHIDANI representation is carried out, apertures [ which is represented by the front spiracle represented by stag beetle paw ticks and NAMIKOHDANI, the Tyrophagus putrescentiae, and Dermatophagoidea farinae ], IEASARADANI, and KAZARI — a sinkin, although it can be applicable by all classes, such as \*\*\*\*\* represented by tick Among house dust, on especially bedding and effectiveness is especially in the department of Chile Dani and Epidemiotida leading to the allergosis.

[0060] The allergen reduction-ized fiber of this invention — bedding, such as bedding, a bolster, a blanket, a mattress, a bed mat, and a sheet, and covering — in the car supplies [ such as filter, car sheets, such as furniture made of cloth, such as a sofa made of cloth, a chair, and a bed, and a covering, air cleaner of furniture, an air-conditioner, and a cleaner, a car mat, and an infant seat, ] — it can use suitable for textiles, such as sewing etc.-based toy, carpets, a curtain, clothes, and a towel.

[0061] [Example]

Although an example is hung up over below and this invention is explained to it in more detail, this invention is not limited only to those examples.

[0062] [Example 1]

The benzoyl-peroxide (sigma ARUDO rich company make, the purity 75% 1st class specification) 1 weight section, As an allergen reduction-ized component, the anionic surfactant "EMARU 2F needle" (Kao [ Corp. ] make, active principle or 95% of solid content) 1 weight section, The chlorobenzene (sigma ARUDO rich company make, 99.5% best specification of purity) 10 weight section, the aqueous emulsification dispersion liquid which consist of the purified water 1000 weight section — further — allergen reduction — as a degassed part — the 4-vinyl phenol (made in Lancaster: 10% propylene glycol solution of purity) 100 weight section — The polyethylene-glycol (Wako Pure Chem make: Mw7500) 20 weight section was added as a hygroscopic component, and fiber processing liquid was prepared.

[0063] The cloth 20 weight section made from polyethylene terephthalate (PET) was immersed into processing liquid, it heated for 60 minutes at 100 degrees C, and graft polymerization was performed. Then, the extract was performed for PET weaving [ finishing / processing ] for 30 minutes in 100-degree-C purified water, and in order to make a front face into neutrality further, the text's which raises after 30-minute neutralization processing at 50 degrees C with a

sodium-hydroxide water solution 0.5%, dries, and consists of allergen reduction-ized fiber was obtained.

In addition, pH was 7.0 when surface pH was measured by the approach of measuring pH using the pH indicator paper etc., after putting for 15 minutes until pure water was dropped at the front face of the obtained textile and the front face fully carried out humidity.

[0054]

(Example 2)

As an allergen reduction-ized component, the poly thirosin (INC biochemicals company make: weight-average-molecular-weight Mw=18000-35000) 2 weight section, As a hygroscopic component, the polyethylene-glycol (Wako Pure Chem make: Mw7500) 2 weight section, As a binder, an ethyl acrylate and the methyl-methacrylate "ODORAGITTO NE30 copolymer D" (product made from Rohm Pharma: 30% of solid content) 2 weight section, In order to make the purified water 100 weight section and a fiber front face into acidity as the Norian system surfactant "emulgen 911" (Kao Corp. make) 0.1 weight section and a solvent, mixed stirring of the barium-hydroxide (Wako Pure Chem make) 0.1 weight section was carried out, and fiber processing liquid was prepared. The spray was carried out to homogeneity so that it might become a polyester nonwoven fabric (100g of eyes/m<sup>2</sup>) with 20microl/cm<sup>2</sup>, at the room temperature, processing liquid is left for 8 hours, and was dried, and the textile made from allergen reduction-ized fiber was obtained.

In addition, pH was 8.3 when surface pH was measured by the approach of measuring pH using the pH indicator paper etc., after putting for 15 minutes until pure water was dropped at the front face of the obtained textile and the front face fully carried out humidity.

[0055]

(Example 3)

the polyethylene terephthalate ([limiting viscosity eta] =0.65) 100 weight section and allergen reduction — the polypropylene-glycol (dial mold Wako Pure Chem make: average molecular weight 3000) 10 weight section and the magnesium-hydroxide (Wako Pure Chem make) 10 weight section were used as a degassed part, the pressurized kneader was used as a hygroscopic component with the PORIPA rabbit n phenol "mu Chinese quince car M" (Maruzen Petrochemical Co., Ltd. make, weight-average-molecular-weight Mw=5500) 20 weight section, and it kneaded on the conditions for 20 minutes by 260 degrees C. It extruded with the screw mold 1 shaft extrusion vessel after kneading, and cast to the pellet type. Spinning of the obtained pellet was carried out by the melt spinning method (the filter of the pack in spinning is 270 meshes), and it extended, and rinsed, and it dried and allergen reduction-ized fiber was obtained. Furthermore, this fiber was used as the plain weave and the textile made from allergen reduction-ized fiber was obtained.

In addition, pH was 11.0 when surface pH was measured by the approach of measuring pH using the pH indicator paper etc., after putting for 15 minutes until pure water was dropped at the front face of the obtained textile and the front face fully carried out humidity.

[0056]

(Example 4)

The benzoyl-peroxide (sigma ARUDO rich company make: the purity 75% 1st class specification) 1 weight section, As an allergen reduction-ized component, the anionic surfactant "EMARU 2F needle" (Kao Corp. make: active principle or 90% of solid content) 1 weight section, The chlorobenzene (reagent by sigma ARUDO rich company: 99.5% best specification of purity) 10 weight section, the aqueous emulsification dispersion liquid which consist of the purified water 1000 weight section — further — allergen reduction — as a degassed part — the  $\alpha$ -vinyl phenol (made in Lancaster: 10% propylene glycol solution of purity) 100 weight section -- The polyethylene glycol (Wako Pure Chem make: Mw=7500) 20 weight section was added as a hygroscopic component, and fiber processing liquid was prepared.

[0057]

The cloth 20 weight section made from PET was immersed into the obtained processing liquid, it heated for 60 minutes at 100 degrees C, and graft polymerization was performed. Then, in order to perform an extract for processed PET weaving for 30 minutes in 100-degree-C purified water

Polyethylene terephthalate ([limiting viscosity eta]=0.65) was extruded with the screw mold 1 shaft extrusion vessel, and was cast to the pellet type. Spinning of the obtained pellet was carried out by the same approach as an example 3 (the filter of the pack in spinning is 270 meshes), and it extended, and rinsed, and it dried and fiber was obtained. Furthermore, this fiber was used as the plain weave and the textile was obtained.

In addition, pH was 6.7 when surface pH was measured by the approach of measuring pH using the pH indicator paper etc., after putting for 15 minutes until pure water was dropped at the front face of the obtained textile and the front face fully carried out humidity.

[0073]

(Evaluation of the allergen reduction effectiveness)

It produced ten 10cm×10cm pieces of an evaluation cloth at a time using the textile produced in examples 1-6 and the examples 1-3 of a comparison. Scattered 5ml of preparation allergen liquid which made the liquid which becomes this piece of an evaluation cloth from the ethyl alcohol 90 weight section and the purified water 10 weight section distribute the dust due (Der p 1 allergen 10micro/g content) 1 weight section, it was made to dry for 5 minutes in 50-degree C oven, and the sample for evaluation was produced. this sample — the constant temperature of immediately after sample production, and 25 degrees C and 75%RH (absolute-humidity 174 g/m<sup>3</sup>) the amount of allergen after 12-hour neglect was measured by the following approaches in the constant humidity chamber

[0074]

First, the extract was sampled, immediately after rounding off and putting the piece of an evaluation cloth which made allergen contain into the glass test tube of 15mL \*\*, putting in the extract (what added a 1wt% BSA and 0.05wt% Tween20 to the phosphoric acid buffer (pH=7.35)) of 10mL, and shaking with for [ sufficient ] 20 minutes. The amount of the allergen in the obtained extract was measured using the ELISA kit (LCD allergy lab company make), and was converted into Der p 1 amount per two 1mL.

The result was shown in Table 1.

[0075]

[Table 1]

	サンプル作製液液 (ng/m <sup>2</sup> )	12時間恒温恒湿室内に放置せ (ng/m <sup>2</sup> )
実験例1	2537(SD=220)	359(SD=78)
実験例2	3752(SD=311)	153(SD=56)
実験例3	2841(SD=199)	118(SD=32)
実験例4	2911(SD=201)	1520(SD=115)
実験例5	3007(SD=228)	1734(SD=98)
実験例6	3589(SD=219)	1890(SD=333)
比較例1	2509(SD=250)	2733(SD=149)
比較例2	2948(SD=329)	2359(SD=205)
比較例3	3589(SD=219)	2751(SD=276)

[0076]

the allergen which suited the level higher than Table 1 immediately after sample production in the textile made from allergen reduction-ized fiber produced in the examples 1-6 — 12 hours — constant temperature — it was left in the constant humidity chamber and, behind, the amount of allergen decreased greatly. Very high allergen reduction-ized effectiveness was accepted in the textile made from allergen reduction-ized fiber produced in the examples 1-3 especially adjusted so that a front face might become neutrality or shallowness. This showed that the neutral and shallowing thing of effectiveness was more higher than the thing of acidity [ front face ].

In the test produced on the other hand in the examples 1-3 of a comparison which did not carry out allergen reduction-ized processing, allergen reduction-ized effectiveness was hardly

and to make a front face into acidity further, with 0.1-N hydrochloric acid, at 50 degrees C, it rinsed after 30-minute processing, it dried, and the textile made from allergen reduction-ized fiber was obtained.

In addition, pH was 3.0 when surface pH was measured by the approach of measuring pH using the pH indicator paper etc., after putting for 15 minutes until pure water was dropped at the front face of the obtained textile and the front face fully carried out humidity.

[0068]

(Example 5)

As an allergen reduction-ized component, the poly thirosin (INC biochemicals company make: weight-average-molecular-weight Mw=18000-35000) 2 weight section, As a hygroscopic component, the polyethylene-glycol (Wako Pure Chem make: Mw7500) 2 weight section, As a binder, an ethyl acrylate and the methyl-methacrylate "ODORAGITTO NE30 copolymer D" (product made from Rohm Pharma: 30% of solid content) 2 weight section, In order to make the purified water 100 weight section and a fiber front face into acidity as the Norian system surfactant "emulgen 911" (Kao Corp. make) 0.3 weight section and a solvent, mixed stirring of the barium-hydroxide (Wako Pure Chem make) 0.1 weight section was carried out, and fiber processing liquid was prepared.

The spray was carried out to homogeneity so that it might become a polyester nonwoven fabric (100g of eyes/m<sup>2</sup>) with 20microl/cm<sup>2</sup>, at the room temperature, processing liquid is left for 8 hours, and was dried, and the textile made from allergen reduction-ized fiber was obtained.

In addition, pH was 3.3 when surface pH was measured by the approach of measuring pH using the pH indicator paper etc., after putting for 15 minutes until pure water was dropped at the front face of the obtained textile and the front face fully carried out humidity.

[0069]

(Example 6)

the polyethylene terephthalate ([limiting viscosity eta]=0.65) 100 weight section and allergen reduction — the polypropylene-glycol (dial mold Wako Pure Chem make: average molecular weight 3000) 10 weight section and the iron(III) chloride (Wako Pure Chem make) 1 weight section were used as a degassed part, the pressurized kneader was used as the PORIPA rabbit n phenol "mu Chinese quince car M" (Maruzen Petrochemical Co., Ltd. make, weight-average-molecular-weight Mw=5500) 20 weight section, and it kneaded on the conditions for 20 minutes by 260 degrees C. It extruded with the screw mold 1 shaft extrusion vessel after kneading, and cast to the pellet type.

Spinning of the obtained pellet was carried out by the melt spinning method (the filter of the pack in spinning is 270 meshes), and it extended, and rinsed, and it dried and allergen reduction-ized fiber was obtained. Furthermore, this fiber was used as the plain weave and the textile made from allergen reduction-ized fiber was obtained.

In addition, pH was 2.7 when surface pH was measured by the approach of measuring pH using the pH indicator paper etc., after putting for 15 minutes until pure water was dropped at the front face of the obtained textile and the front face fully carried out humidity.

[0070]

(Example 1 of a comparison)

The PET weaving used in the example 1 was used without performing allergen reduction-ized processing, and the textile was obtained.

[0071]

(Example 2 of a comparison)

The polyester nonwoven fabric (100g of eyes/m<sup>2</sup>) used in the example 2 was used without performing allergen reduction-ized processing, and the textile was obtained.

In addition, pH was 7.5 when surface pH was measured by the approach of measuring pH using the pH indicator paper etc., after putting for 15 minutes until pure water was dropped at the front face of the obtained textile and the front face fully carried out humidity.

[0072]

(Example 3 of a comparison)

accepted.

[0077]

[Effect of the Invention]

Since the allergen in a life space can be decreased under the humidity of everyday life and allergen reduction-ized processing is performed to the fiber itself by using for bedding, a carpet, a sofa, a curtain, etc., the allergen reduction-ized fiber of this invention does not have risk of drugs going into the inside of the body, either, and it can live comfortably, without causing an allergy symptom, even if it is the patient who holds the allergosis, moreover, the fiber polluted by allergen — reduction — time and effort, such as carrying out after treatment of a degassed part, is not applied

[Translation done.]

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